

work of the country, often cutting down through the older water-courses. Speaking of Gippsland, the author remarks that the streams "have scooped out deep valleys. The lofty hills have not been upheaved in isolated masses, but are the remains of formations which have been swept away by the slow action of water. If all the rock-formations could be restored and placed in the positions which they once occupied, Gippsland would be an immense nearly level plateau. As a familiar illustration, we may liken the mountains formed of palæozoic rocks to the humps of earth left by the navvy when he digs a cutting. The grass on the surface of the hump shows what was once the height of the ground which has been removed; and the recent tertiary formations on the tops of the hills in Gippsland are evidence of the original height of the whole area. The rocks which once occupied the intervening spaces have been eroded by water; and the height of the hills above the valleys affords some hint as to the vertical extent which has been cut away." The author believes that Victorian surface-geology affords "an answer to those geologists who have urged that the greater amount of erosion everywhere has been effected by marine agency, and not by rivers, rains, and the wasting action of the atmosphere." And, indeed, no one can study the maps and sections in this volume without being convinced that the erosion of the present and of the old valley-system has been wholly a sub-aërial process.

Mining operations have done a good deal towards elucidating the older system of water-courses which were overflowed and buried beneath basalt. These water-courses or "leads," as the miners call them, contain richly auriferous "drifts," and they are accordingly explored and ransacked by shafts and adits. Thus, at Ballarat, the river Yarrowee must have had its course shifted considerably eastward by the overflow of basalt. Its old winding channel has been explored under the overlying basalt, and the channels of its tributary rivulets from the east have been followed under the bed of the present river.

From the shafts and the natural sections along the sides of the valleys, we learn that the volcanic phenomena continued to manifest themselves for a prolonged period. Showers of ashes and streams of basalt were thrown out at long intervals, during which gravel and sand were accumulated in the water-courses above the last erupted materials. Hence we now find sections where sheets of basalt alternate with stream-gravel and with layers of clay and ancient soil. As in Auvergne, the lapse of time which separated the oldest from the most recent volcanic rocks cannot but have been great. On the one hand, some of the basalt plateaux have been trenched by valleys several hundred feet deep, and fragments of the plateaux have been left isolated; on the other hand, there occur craters and cones of ash so fresh that not many centuries may have passed away since they ceased to be in eruption.

But the changes of level effected by the outpouring of volcanic rocks at the surface have not been the only causes at work in greatly modifying the drainage of the country. In comparing the water-courses with the quantity of water flowing in them, still more in examining the endless lines of water-course in which there is no water at all, we are forced to conclude that the rainfall must be much less now than it was in a very recent geological period. Over a large part of Victoria the ground is low and sandy;

and there the streams which come down from the hills, after wandering hopelessly about among pools and scrub, disappear altogether, being partly evaporated and partly absorbed into the parched soil. Mr. Smyth mentions an interesting fact when he says that the old drainage system of the country can often be traced only by the vegetation. "The Murray pine, in the midst of small Eucalypti, marks distinctly the line of the ancient water-courses." "The beds of old lakes and tributary creeks can now be discovered in some places only by the timber which they bear." This general desiccation of the country points to some wide-spread geological cause. Possibly it may be due—in part at least—to a comparatively recent elevation of the northern part of Australia, whereby the northerly winds, having a broad belt of land to pass over, lose much of their moisture before they reach the high lands of Victoria and New South Wales. The want of an abundant and constant supply of water is in some parts of the colony a serious obstacle to improvement. In particular, it operates most prejudicially upon gold-mining: no pains ought to be spared, therefore, to prevent the destruction of timber, and to take every opportunity of planting it where it is likely to be of service.

In conclusion, the volume which Mr. Smyth has produced, though too bulky and too detailed for general readers, is a storehouse of information on the subject of which it treats, and will undoubtedly take its place as one of the standard works of reference for all that relates to the occurrence and the mining of gold. ARCH. GEIKIE

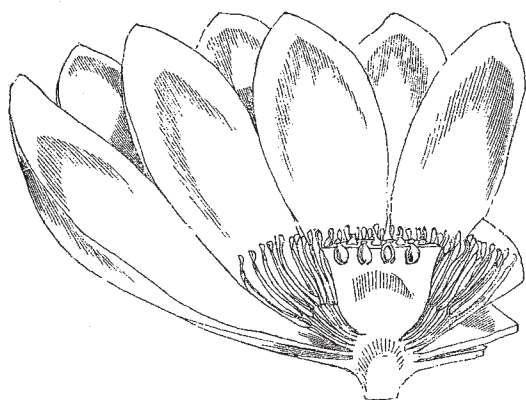
OLIVER'S INDIAN BOTANY

First Book of Indian Botany. By Daniel Oliver, F.R.S., F.L.S., Keeper of the Herbarium and Library of the Royal Gardens, Kew, and Professor of Botany in University College, London. With numerous Illustrations. Small 8vo. pp. xii. and 394. (London: Macmillan and Co. 1869.)

THE want of special works introductory to the study of the botany of the principal tropical and southern countries of the globe has long been felt. The medical man, the student, and the amateur resident or travelling in India and our principal colonies, find it hard work to keep up or get up their botany by introductions and class-books founded on British plants, whilst the schoolmaster would find himself very much abroad who should attempt to teach his pupils Australian Botany by Henfrey's or Balfour's Introductions, or by Oliver's Elements. Hence the need of a series of works devoted to the teaching of botany with a special reference to the wants of the sojourners in foreign parts, and illustrated by the common plants to be found therein. With the exception of the admirable text-books of American Botany, of Asa Gray, we know of no work of the nature indicated, illustrative of any extra-European Flora. There was, indeed, some talk a few years ago of a series of such works, embracing all departments of Natural History, being authorised by the local governments of India,—but nothing has come from that quarter: and much as we then regretted the supineness of the Indian authorities in the matter, we no longer do so; for India could assuredly never have produced a work of so high an order as that whose title stands at the head of this notice, for a better considered

and better executed work of the kind it has never been our good fortune to meet with, and it at once places its author first in the rank of English writers of Botanical Class-books.

Professor Oliver states in the preface that his book is in substance his "Lessons on Elementary Botany," adapted for use in India: but we find that it is this and a great deal more; for after following that excellent model in the part that relates to the structure of plants and the functions of their organs, a larger portion of the book is taken up with concise descriptions of 116 principal natural orders of India, illustrated by a clear analysis of the parts of a very common Indian flower, inasmuch that, if we were asked what is the best text-book for a student in this country who wishes to acquire more knowledge of botany than is needful for a mere pass examination, without at all setting aside



Vertical Section of flower of *Nelumbium*, showing the hypogynous stamen and carpels singly immersed in a turbate receptacle

the former work just mentioned, we do not know any to which we could so conscientiously direct attention, as almost all the plants in question may be easily found in any good botanic garden. Attached to each of the descriptions is a schedule of the floral characters on Henslow's plan, and a brief sketch of the principal matters of interest, structural, physiological, and economic, to be observed in Indian plants of the order, whilst the greater part are further accompanied by beautiful and original drawings and diagrams by Fitch, which delineate the floral organs graphically and naturally. We may add, too, that the more advanced and inquiring student has his attention occasionally directed to matters on which additional information is desired; as, for example, in the genus *Drosera*, where our author writes: "Some species exhibit a low sensibility or irritability in the leaves, which curl upon particles placed on their glandular hairs. Is this the case with Indian species? and do they appear to discriminate between organic and inorganic matter offered to them?"

Or, again, in *Campanulaceæ*: "Two small flowered Campanulas of Northern India exhibit the curious phenomenon of dimorphic flowers. Besides the flowers of usual form, there are smaller ones about the size of coriander seeds, which never open, but which nevertheless mature abundant seed. The latter must necessarily be self-fertilised, while the flowers of ordinary form are often, if not always, crossed by the pollen of other flowers of the same species. The part which these hermetically-sealed

flowers play in the economy of plants is not yet well made out. They are found in isolated species and genera belonging to widely different natural orders, and it would be worth while to look for fresh examples amongst Indian weeds."

We consider such suggestions of extreme importance, as some stimulus of this kind is wanted to urge students to something more than the requirements of the passing time. It is notorious that though great acuteness is often shown amongst the higher proficient in botany who come before public examiners, not one in a hundred goes a step beyond what is wanted to secure a certain class or scholarship. There must, we imagine, be something in the style of public teaching on such subjects which seems to check all real interest, much less to excite a spirit of love or enthusiasm for science itself, without which it is quite certain that we shall have no new fellow-workers.

In conclusion, we would recommend a close study of the precision of our author's descriptions, and the clearness and terseness of his diction, to the writers of



SACRED LOTUS (*Nelumbium speciosum*), about one-tenth to one-fifteenth natural size



SCREW PINE (*Pandanus*), showing aerial adventitious roots

botanical text-books, as worthy of their imitation. These are qualities which improve the mind of the pupil more

than is usually supposed. They are conspicuously present in French class-books, but their absence is too often as conspicuous in English ones.

The author states in his preface that his chief difficulty has been in the selection of suitable plants to illustrate the natural orders, especially as types which are common in some parts of India, are absent in others. We think, however, that he has been extremely judicious in his selection, which certainly required no little local knowledge, and he has very properly recorded his obligations in this respect to our two great authorities on Indian botany, Dr. Hooker and Dr. Thomson.

If we were required to point out the especial part of the volume in which we think the author's tact has been more peculiarly developed, we would instance that in which he might be supposed to be least familiar. We have read with pleasure the observations on the cryptogamic orders, in admiration of the immense mass of information which is condensed within a short compass, and of its intrinsic value. We are glad to observe that some definitions are to be found in the very copious index, which did not come within the author's views in the text, and it would add greatly to their value if in a future edition little illustrations of such matters could be added in the margin. We have selected some woodcuts which are fair specimens of the 240 engravings in the book.

M. J. BERKELEY

OUR BOOK SHELF

Literature of Natural History.—*Bericht über die wissenschaftlichen Leistungen in der Naturgeschichte der niederen Thiere während der Jahre 1866 und 1867.* Von Dr. Rudolph Leuckart. (Berlin, 1869. London: Williams and Norgate.)

Now that original observers in every branch of natural history are to be found in all civilised countries, it is only by means of such reports as this that the working naturalist can keep himself acquainted with the actual state even of that department of his science which he himself more particularly cultivates. When, as in the present case, a man of real eminence as a naturalist has at his command all the chief languages of Europe, and gives us year by year no mere dry list of papers but full analyses accompanied by critical remarks, we feel that it is not easy to exaggerate the importance of his labours as affecting the general progress of zoology. For the sake of any worker who may be unacquainted with Prof. Leuckart's reports, we may mention that they embrace the groups Vermes, Echinodermata, Coelenterata, and Protozoa, as defined by German writers. The Rotiferi and Bryozoa are included under the Vermes.

Parsons on the Rose. *A Treatise on the Propagation, Culture, and History of the Rose.* By Samuel B. Parsons. Pp. 215. Illustrated. (New York. London: Trübner and Co.)

THE horticultural portion of this work, occupying its first nine chapters, is a digest of some of our best English authors on the subject. Chapter IX., on the Diseases and Insects attacking the Rose, is confessedly little more than a reproduction of the writings of Harris on the same topic, and of use *only* to the American cultivator.

The historical part, contained in Chapters X. to XV., exhibits a remarkable collation of gleanings from history—ancient, mediæval, or modern—of legends, fables, ceremonies, &c., all having some connection (although in some instances rather remote) with the rose. R. C. K.

The Romance of Natural History. By Philip Henry Gosse, F.R.S. 1st and 2d series. (London: James Nisbet and Co.)

THE popularity of these well-known volumes may be looked upon as a standing protest against the common opinion that the exact study of natural objects is inimical to a poetic conception and romantic love of nature. We know of no more delightful New Year's gift for an intelligent boy than Dr. Gosse's eloquent and well-illustrated work.

Our Dumb Neighbours; or, Conversations of a Father with his Children on Domestic and other Animals. By the Rev. T. Jackson. (London: S. W. Partridge and Co.)

THIS is a first-rate picture-book of animals for children. The text is not up to the level of the woodcuts.

Gedächtnisrede auf Alexander von Humboldt. Von H. W. Dove. (Berlin: Harrwitz und Gossman, 1869.)

Alexander von Humboldt. Festrede von Dr. A. Bastian. (Berlin: Wiegandt and Hemfel, 1869.)

THESE are addresses delivered, on the occasion of the recent Humboldt Centenary, before the Prussian Academy of Sciences, and the joint meeting of the scientific societies of Berlin. The memoir of Professor Dove records many interesting personal characteristics of the great German *savant*.

Monthly Bulletin of the Imperial Society of Acclimatization Second Series, January to November 1869.

THE Acclimatization (or, as we term it, Acclimatisation) Society of Paris, was founded in 1854, and appears to be in a most flourishing and active condition. The beautiful gardens of the society in the Bois de Boulogne are known to every visitor of Paris; but the work done by the society can be best judged of by glancing at its "Bulletins." An important part of the operations of the society consists in the distribution of animals and plants to its members, who may wish to experiment in endeavouring to acclimatise such useful species as the society may obtain. Pisciculture of all kinds, marine and freshwater, occupies a large share of the attention of the society: ostreo-culture also and the coral-fisheries—which the French Government has most anxiously fostered on the coast of Algeria—are noticed in articles giving account of recent progress in these departments of industry. The cultivation of the silkworm, however, calls forth the most notable exertions of the society. Large districts in the south of France are given up to this employment. On some of the limestone plateaux north of Nîmes—which are bare for miles and present no soil—holes are excavated, and the necessary earth in which to place the mulberry-trees which are to feed the crops of silkworms reared by the inhabitants of this district is fetched from thirty miles' distance—so valuable is the crop of silk when obtained. To these "Bulletins" we shall return as they make their monthly appearance. At present, on glancing through the year's accumulation, we find, amongst other facts of more than economical interest, an account of the introduction of the salmon of the Rhine into the Lake of Geneva. It has always been held doubtful as to whether salmon could thrive when access to the sea was impossible. The great length of the Rhone, and the overpowering force of its waters at the spot near Bellegarde, called *la perte du Rhône*, renders the Lake of Geneva practically closed from communication with the sea for all ichthyological purposes. Hence it is exceedingly interesting to find that success has attended the efforts of Dr. Chavannes and others to introduce the Rhine salmon to this area. Specimens, put in among many thousand others in 1857, have been recaptured, weighing over four pounds, and with roe; whilst others, evidently the offspring of these, have been also taken. Further experiments are being made on an actually closed lake.